United States Patent [19]

Keesee et al.

[11] **4,406,100**

[45] **Sep. 27, 1983**

[54] **PORTABLE EARTH ANCHOR**

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[73] Assignee: **Westvaco Corporation**, New York, N.Y.

[21] Appl. No.: **268,774**

[22] Filed: **Jun. 1, 1981**

[51] **Int. Cl.**[3] **E02D 5/74**

[52] **U.S. Cl.** **52/155**

[58] **Field of Search** 52/148, 155, 156, 157, 52/158, 159, 166; 212/195

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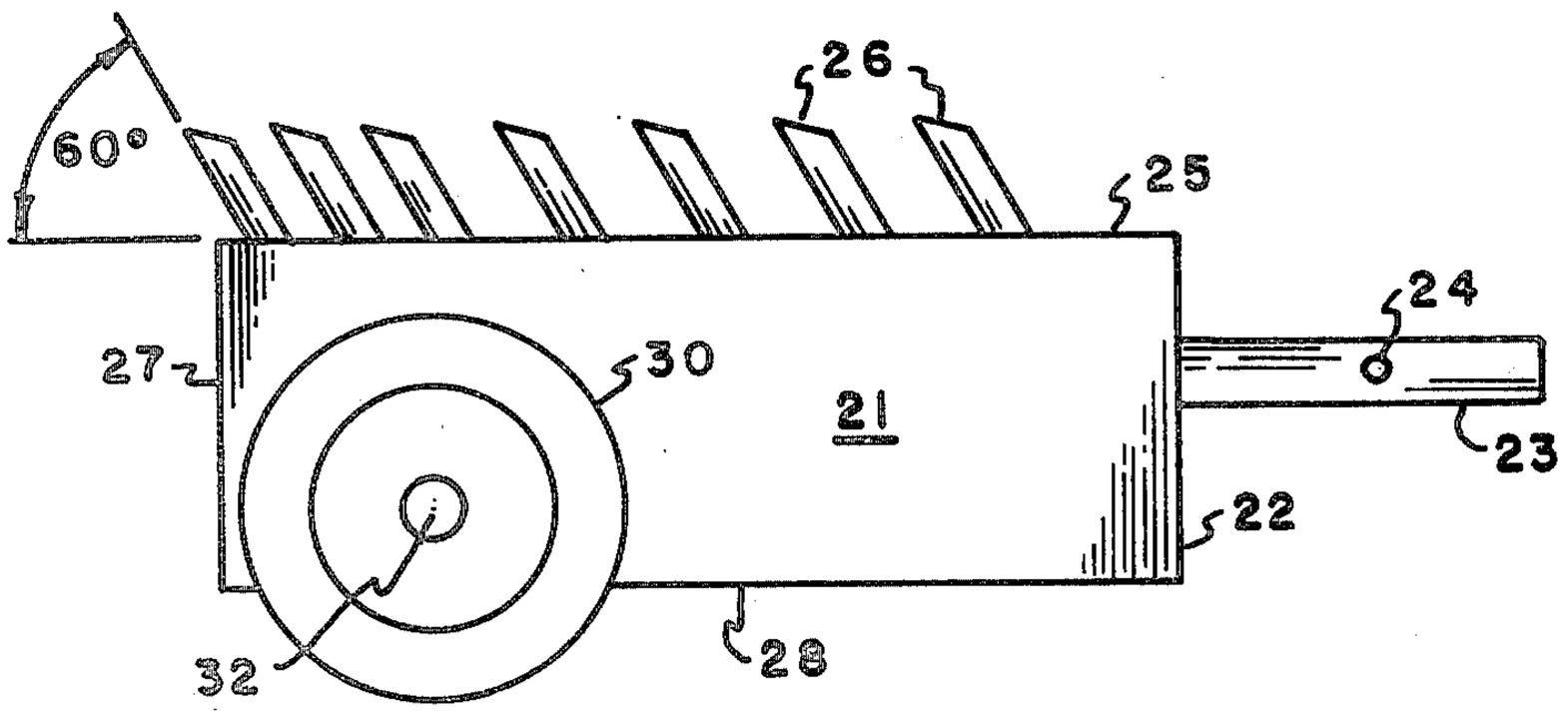
Assistant Examiner—Alvin Chin-Shue
Attorney, Agent, or Firm—W. A. Marcontell; R. L. Schmalz

[57] **ABSTRACT**

A portable earth anchor and foundation pier is provided by a reinforced concrete casting around a steel skeleton comprising wheel axles, draw bar and earth penetrating tines. One embodiment of the invention has ground clearance from a bottom surface for wheel support in a first, transport position. The tines project from the top surface. When inverted for earth penetration by the tines, the transport wheels are positioned out of ground contact.

3 Claims, 16 Drawing Figures



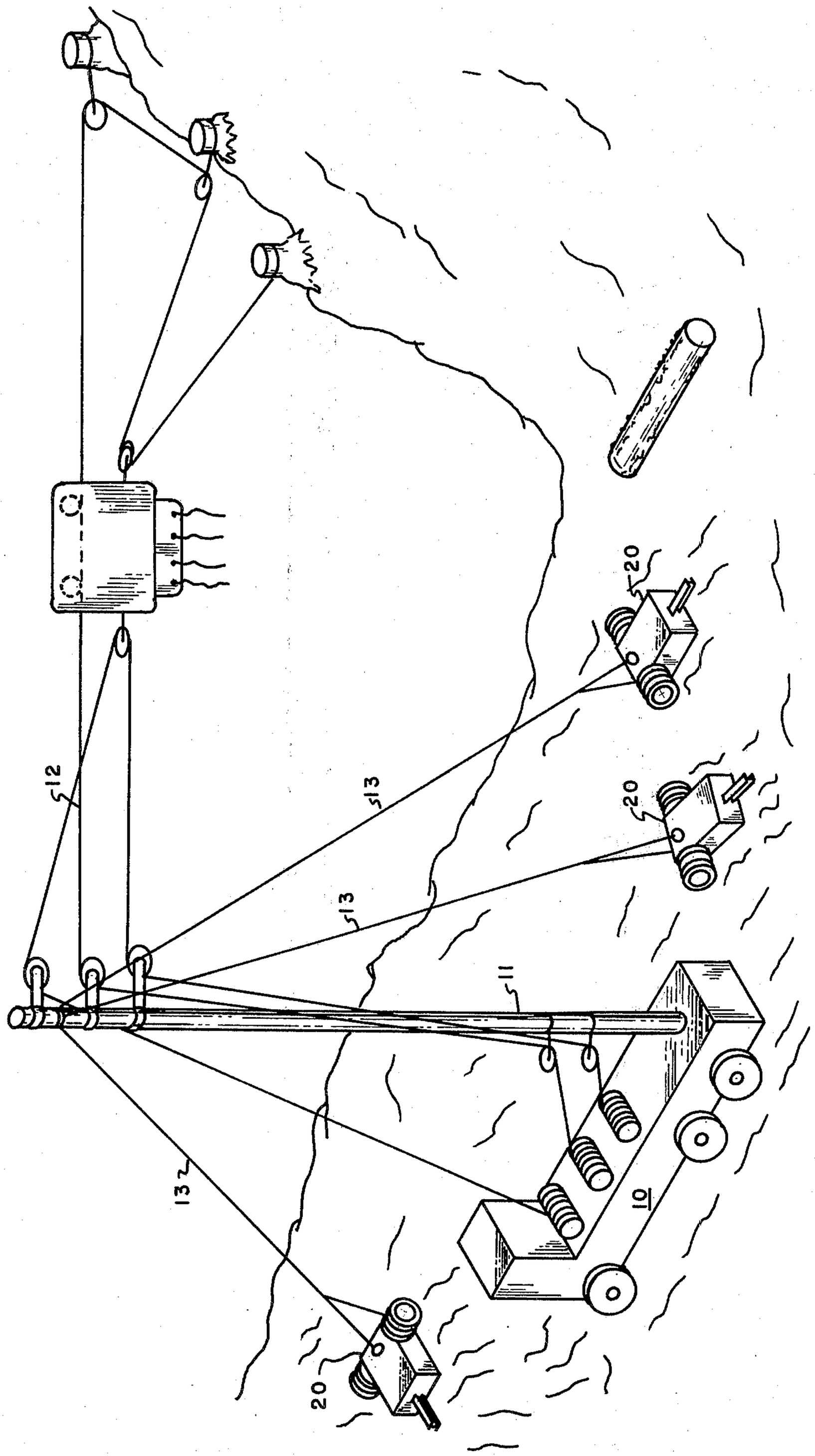


Fig. 1

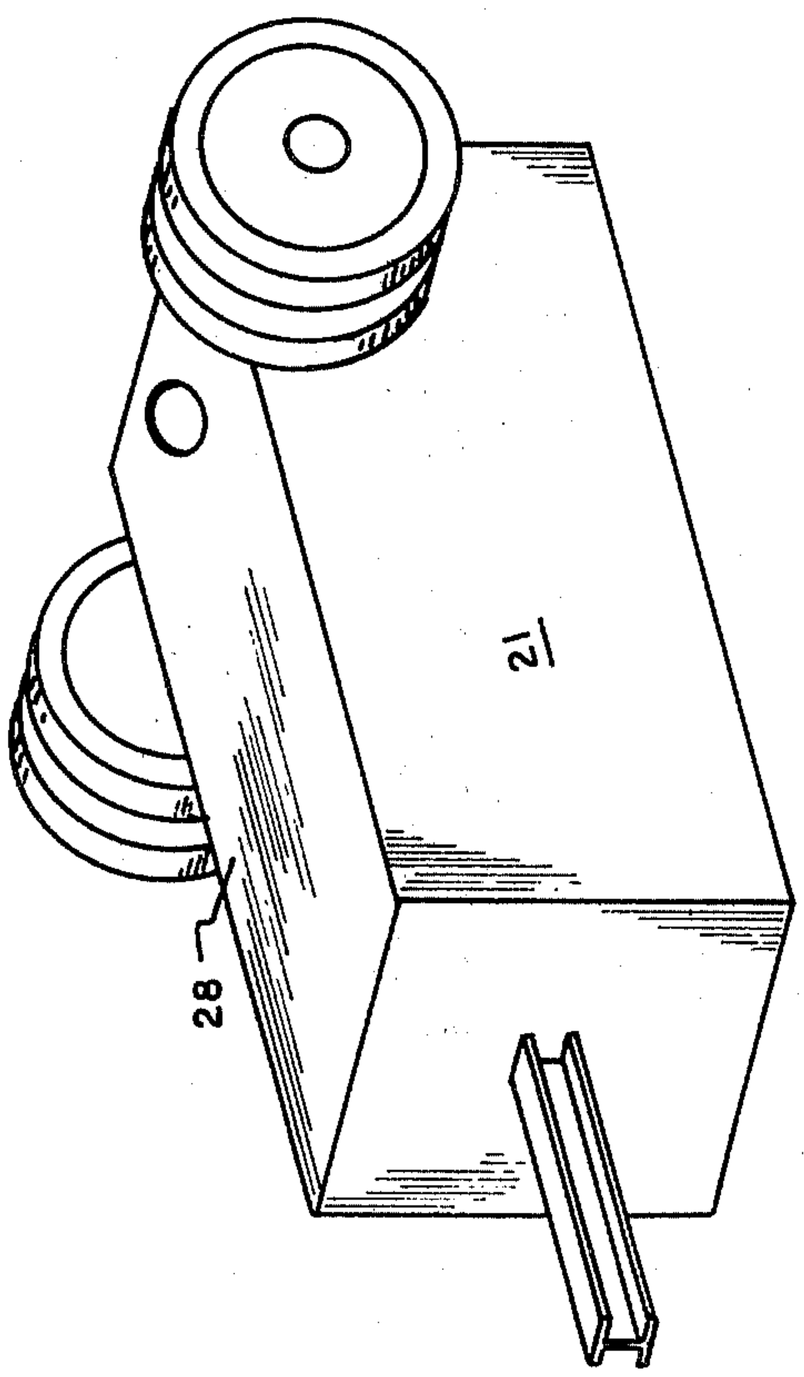


Fig. 5

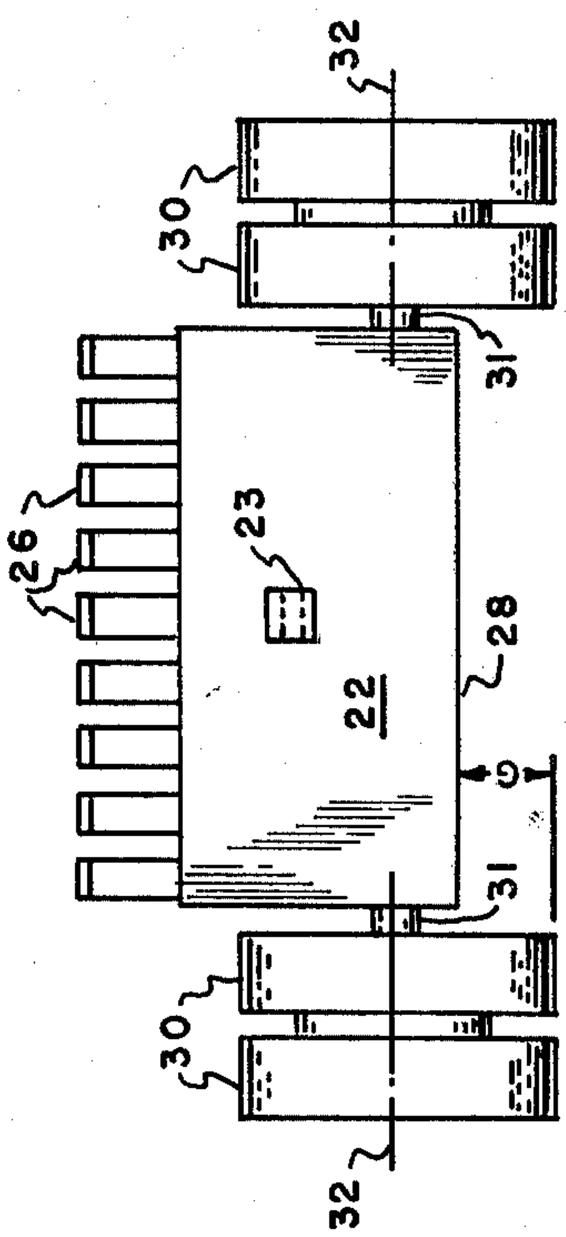


Fig. 4

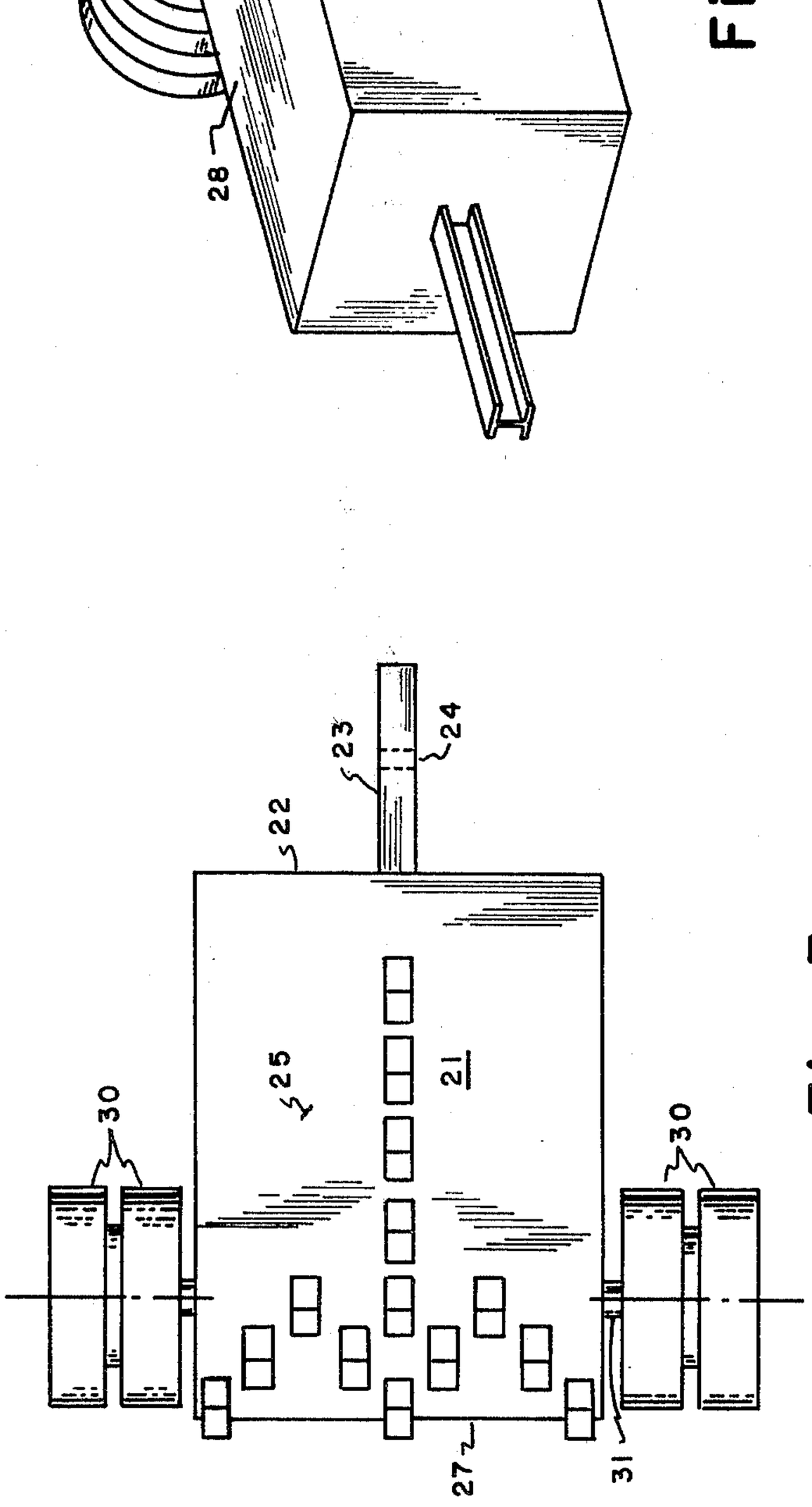


Fig. 3

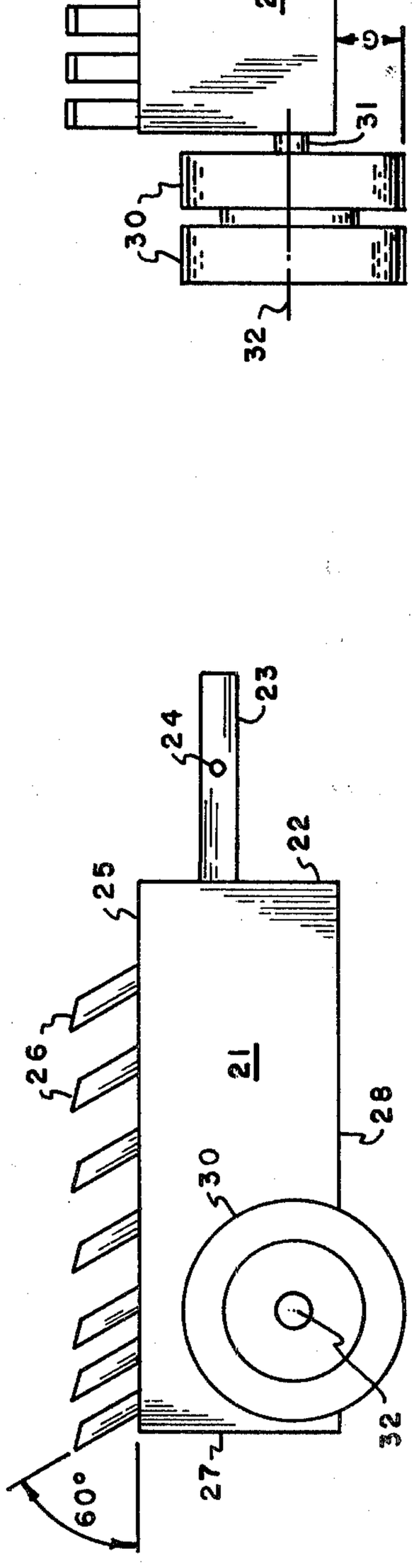


Fig. 2

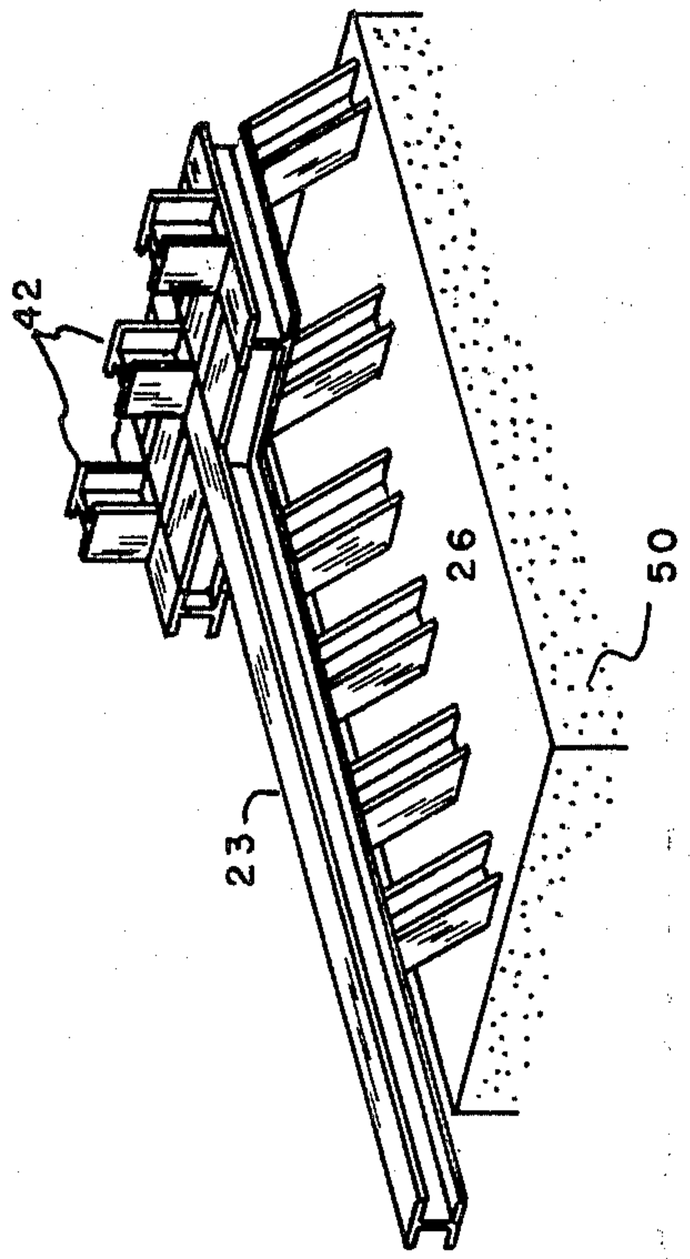


Fig. 9

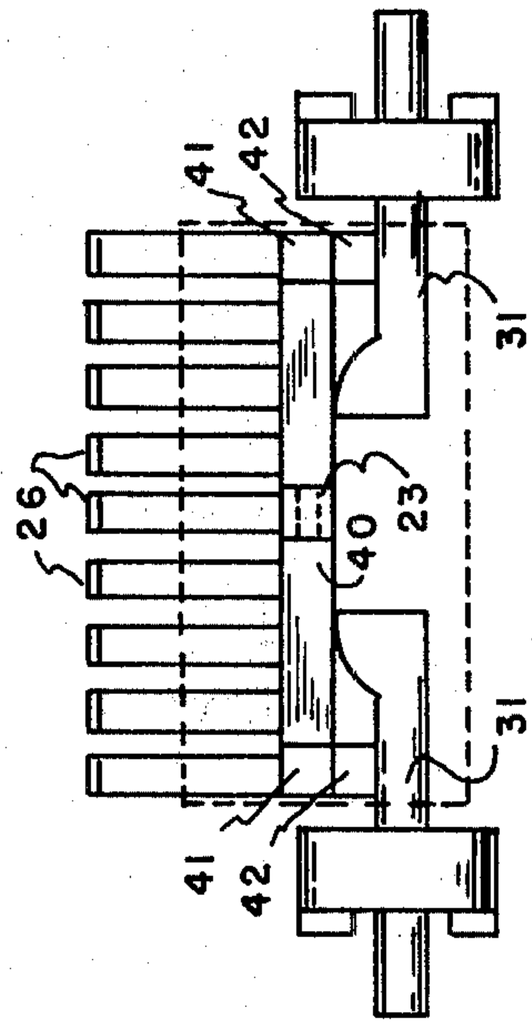


Fig. 8

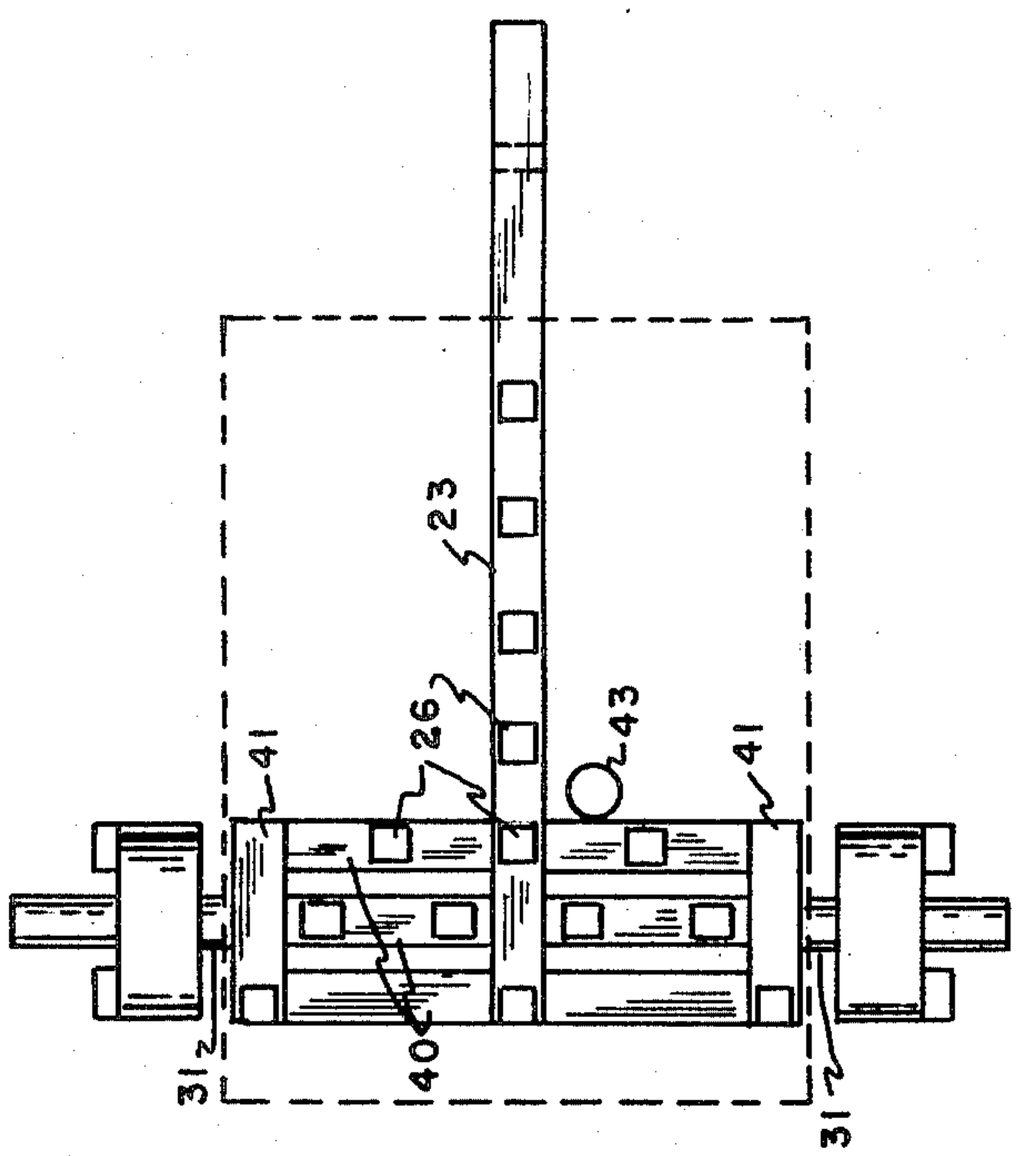


Fig. 7

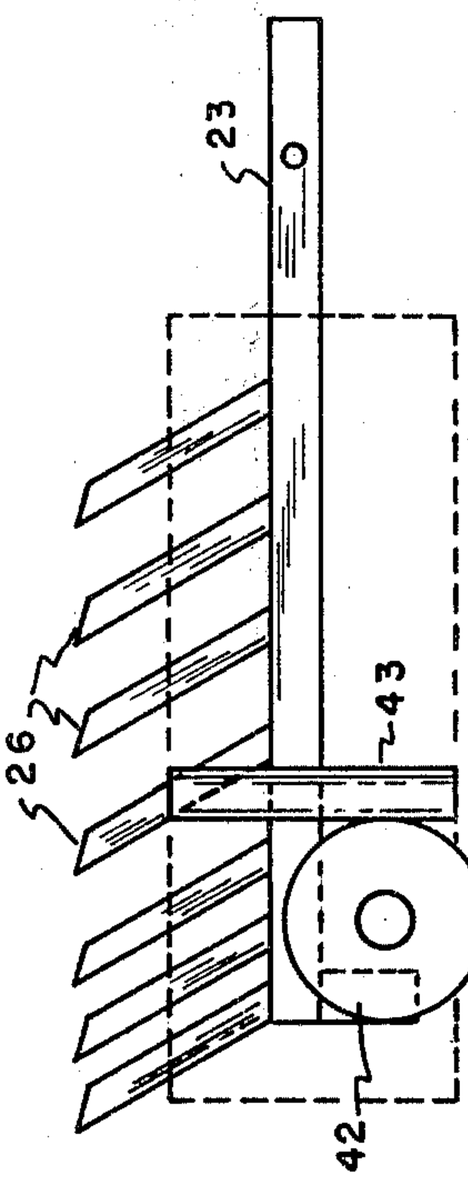
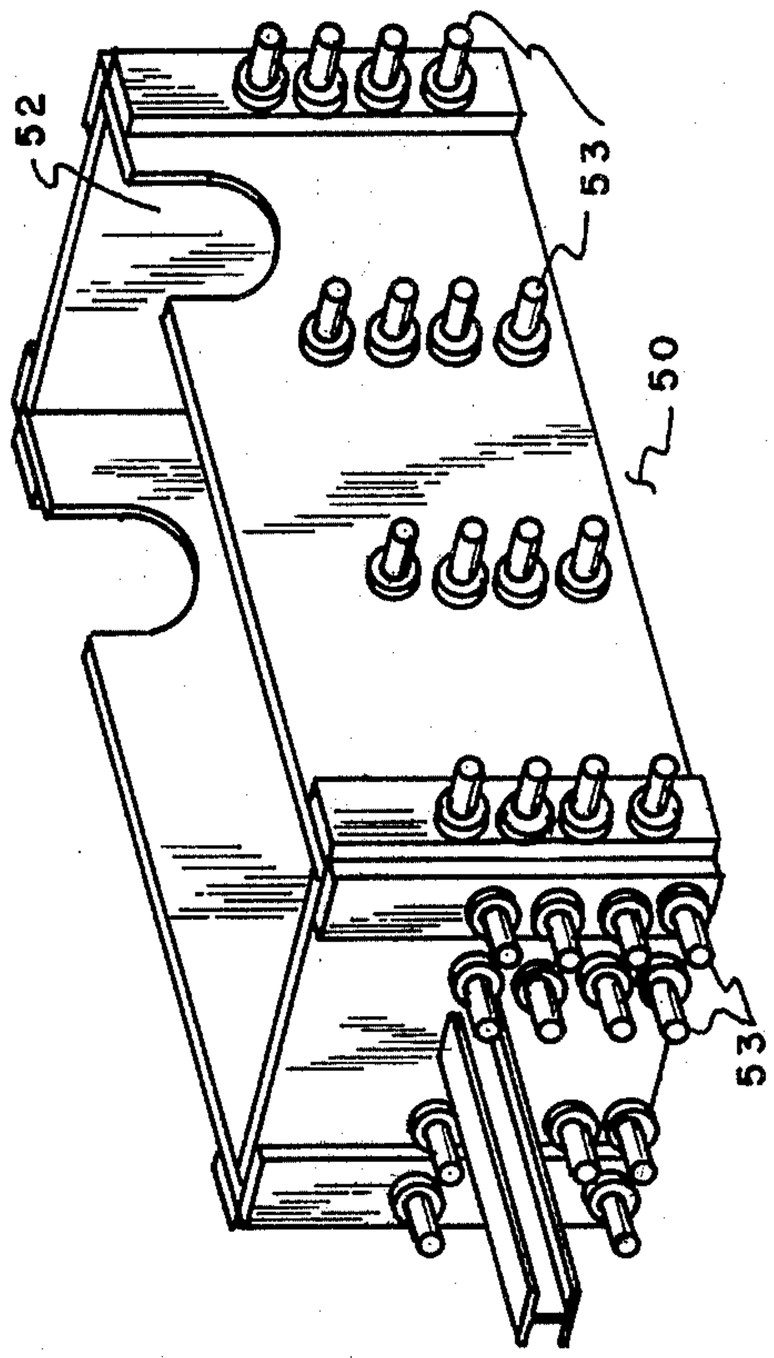


Fig. 6



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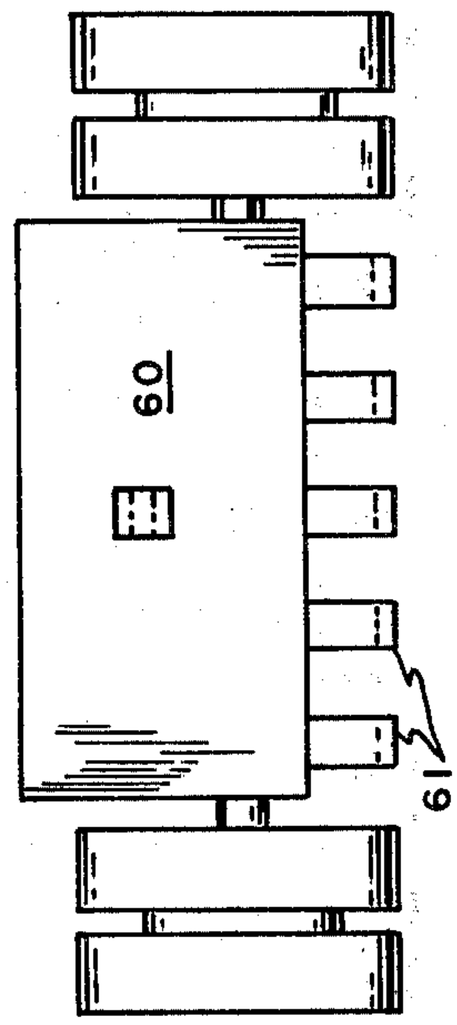

Fig. 13

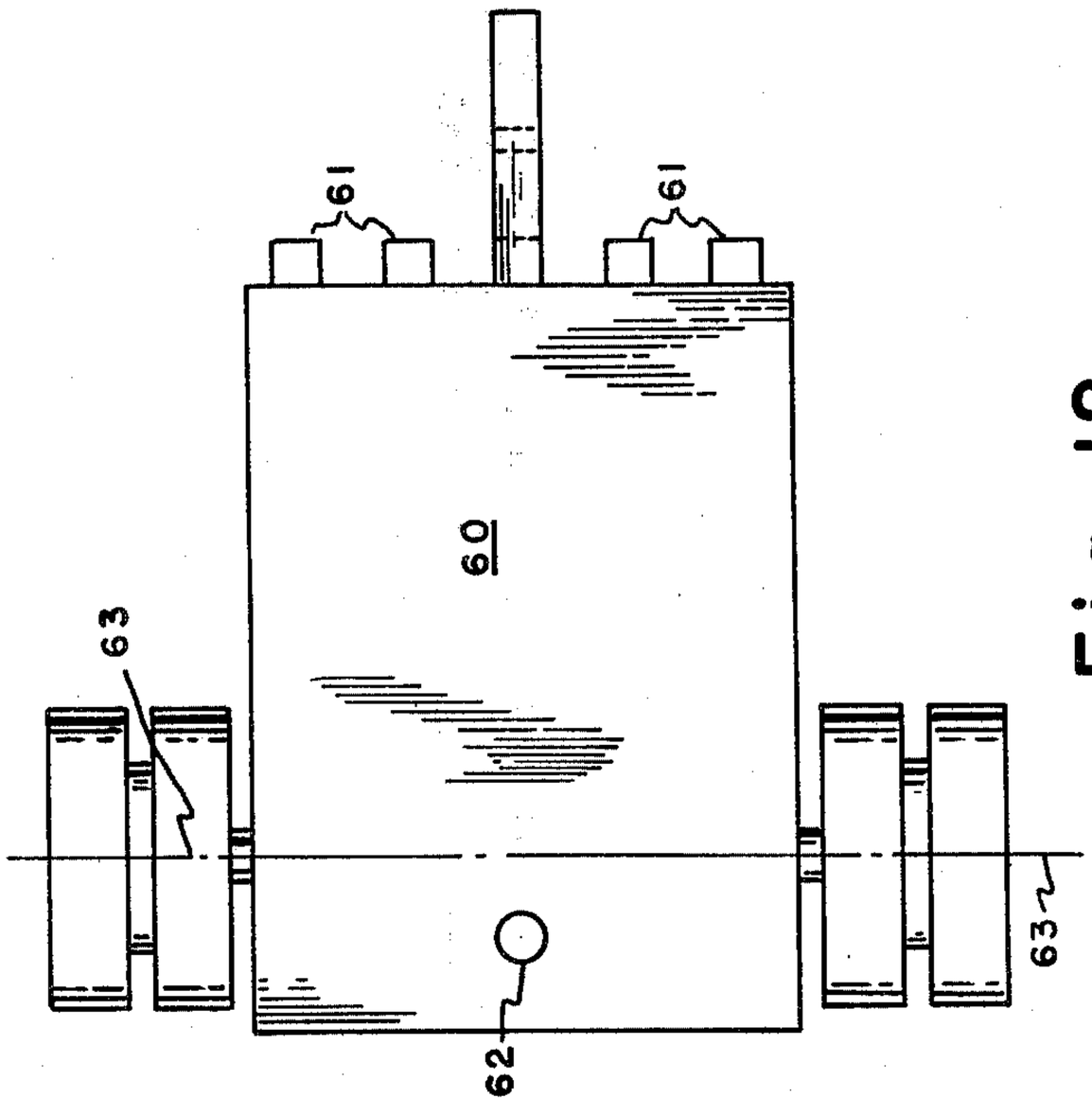

Fig. 12

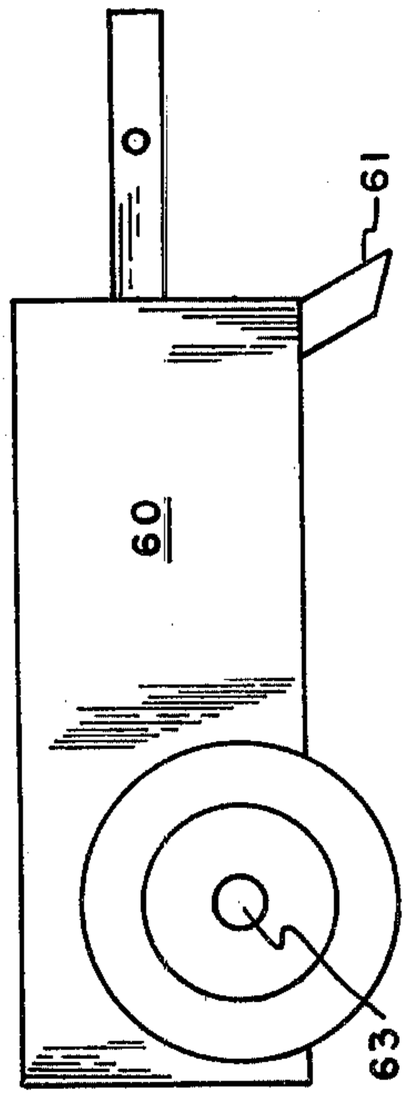

Fig. 11

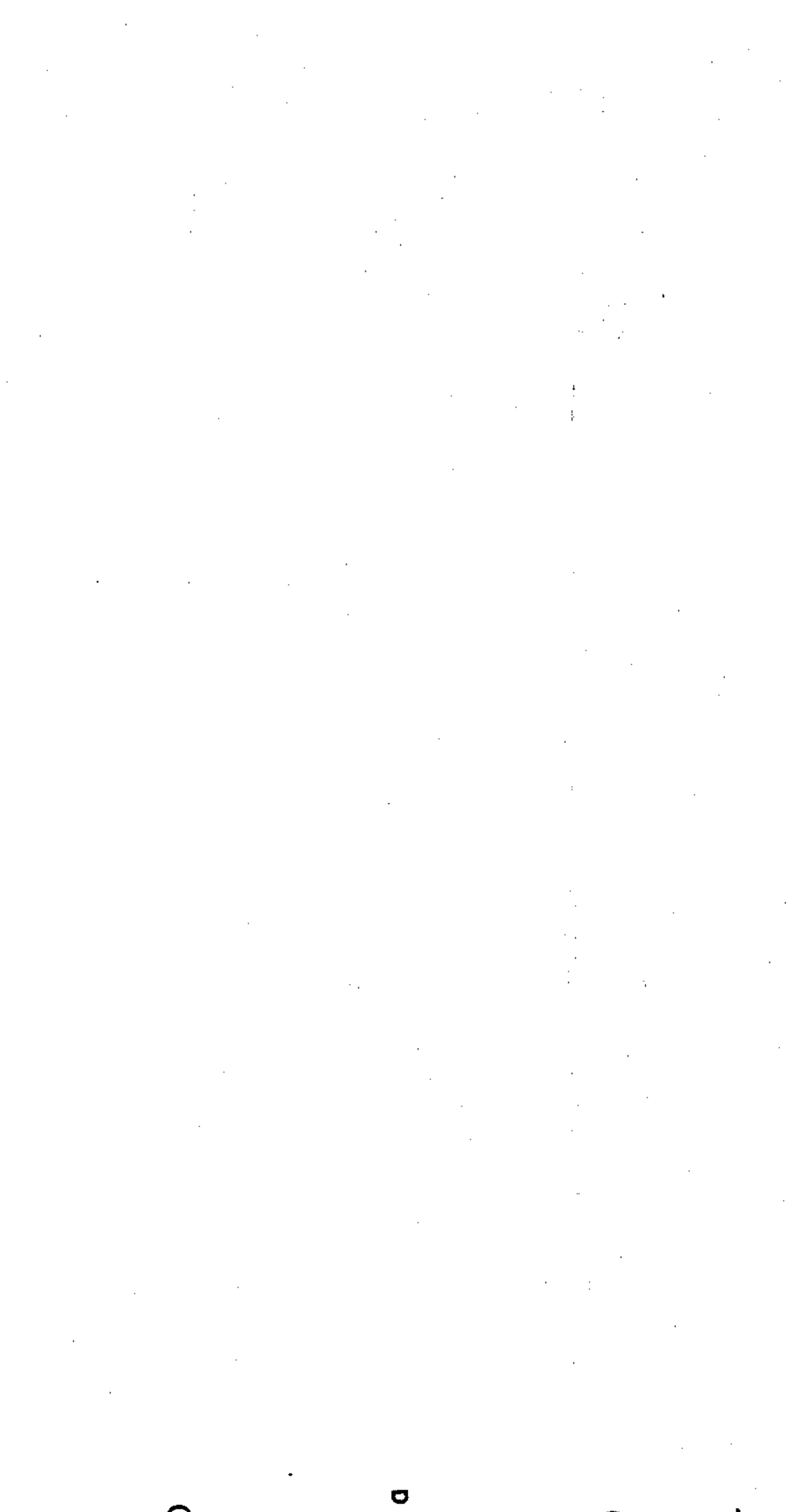

Fig. 15

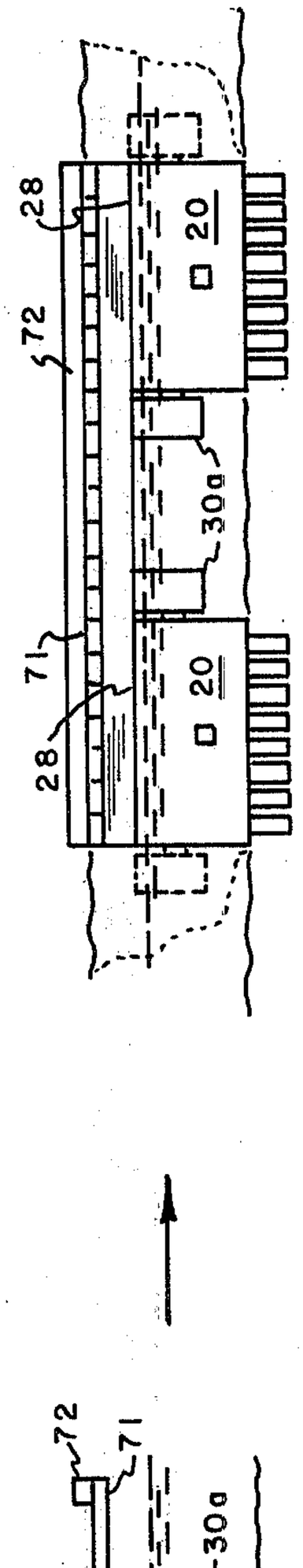

Fig. 14

Fig. 16

PORTABLE EARTH ANCHOR

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to portable earth anchors and foundation piers. In particular, the present invention is directed to a transportable guy wire anchor for logging cable yarders.

2. Description of the Prior Art

Cable logging is a technique frequently used for removing felled trees from rough, mountainous terrain whereby a skyline cable is drawn over a sheave block near the top of a yarder mast and out from the mast over a cutting area. The distal end of the skyline is secured to the ground at a point remote from the yarder; occasionally after passing over a tail block secured to the top of second, remote end mast.

The primary skyline cable carries a sheave mounted carriage block from which a load line is dropped for picking up the load.

In this system, the yarder is a portable, usually truck mounted, power unit associated with a mast structure for driving and controlling several cable winches necessary for reeling and tensioning the skyline, load and carriage traverse cables.

Obviously, all vertical loads on a cable system are supported compressively by the mast. However, the mast, being truck mounted, has relatively little moment restraint against lateral loads. For this reason, the mast is secured laterally by guy wires tensioned from the mast a ground anchor.

As a logging operation progresses, it is necessary to frequently realign or move the cable system. Even if the yarder and mast are not physically transposed, the skyline tail will be aligned along a different azimuth to service a different radial segment of terrain from the yarder center. Such change in azimuth alignment will also require a repositionment of anchor points for the guy wires and dead lines from the mast sheave blocks.

If possible, cable system riggers seek out a large tree or stump for ground anchorage of guy wires and dead lines. However, considering the number of anchor points required for a system against the allowable cone of discretion for each, a suitable tree stump is not always available. In the absence of a suitable anchor tree or stump, the prior art practice is to secure the anchor line around a sizable log for burial at approximately six feet. Although excavating equipment such as backhoes and crawler/scrapers are normally present at logging sites for such tasks, bed rock and massive boulders underlying thin, mountainous topsoil greatly complicate the excavation task.

Collectively, therefore, appropriate anchorage of a cable system represents one of the more perplexing and frequently recurring problems in the cable riggers art and to which the present invention is addressed.

Accordingly, it is an object of the present invention to teach a method of anchoring cable systems that is as portable as the yarder and applicable to most types of forested mountain terrain.

Another object of the present invention is provision of a transportable anchor pier having sufficient mass and ground adherence to secure cable logging guy wires and dead lines.

Another object of the present invention is provision of a multiple purpose pier for logging operations that may be used for small stream and gully bridge foundations and for anchoring skyline cable log retrieving systems.

SUMMARY OF THE INVENTION

These and other objects of the invention are accomplished by means of a concrete casting about a wheel mounted, T-frame trailer. The leg of the trailer T-frame projects beyond the casting to serve as a draft bar. Heavy duty truck wheels having load capacity suitable to the approximate 12 ton weight of the vehicle are secured to opposite ends of the T-frame cross-bar prior to casting so that the load carrying wheel bearing tubes project deeply into the cast mass. Vertical positionment of the wheel axis is such to permit adequate wheel surface clearance in the transport mode. Inversion of the vehicle, however, positions the wheels out of ground contact so that the vehicle weight is concentrated on several raked, ground penetrating tines or spikes which are secured to the T-frame and project beyond the upper cast surface of the vehicle.

A steel-lined tubular space is provided through the approximate vehicle center from top to bottom surfaces for the purpose of threading an anchor cable loop. In the preferred disposition, the rake of the ground spikes is aligned toward the load end of the anchored cable whereby any attempt to drag the anchor will set the spikes into the ground more deeply and securely.

Application of the present invention comprehends that the anchor draft bar is secured to a wheel-skidder and pulled in the transport mode to a desired anchor point. A cable loop is threaded through the anchor tube and the anchor upended onto its spiked surface.

In an alternative application, two or more of the anchors may be positioned in the bed of a small stream or gully as bridge piers to support girders and planking. When need for the bridge has passed, the anchors may be pulled out and drawn to new locations for further use, either as a cable anchor or again as a bridge pier.

BRIEF DESCRIPTION OF THE DRAWINGS

Relative to the drawings wherein like reference characters designate like or similar elements throughout the several figures of the drawings:

FIG. **1** is a pictorial representation of the invention in an operative disposition;

FIG. **2** is an orthographic side elevation of the invention;

FIG. **3** is an orthographic top plan of the invention;

FIG. **4** is an orthographic end elevation of the invention;

FIG. **5** is an isometric view of the invention in operative position;

FIG. **6** is a side elevation of the skeletal structure of the invention;

FIG. **7** is a top plan of the skeletal structure of the invention;

FIG. **8** is an end elevation of the skeletal structure of the invention;

FIG. **9** is an isometric view of the invention in a state of partial fabrication;

FIG. **10** is an isometric view of a concrete casting form for the invention;

FIG. **11** is a side elevation of an alternative embodiment of the invention;

FIG. **12** is a top plan of the invention alternative embodiment;

FIG. **13** is an end elevation of the invention alternative embodiment;

FIG. **14** is a side elevation of the invention disposed in a stream bed bridge pier utility mode;

FIG. **15** is a top plan of the invention disposed in the stream bed bridge pier utility mode; and,

FIG. **16** is an end elevation of the inventiom disposed in a stream bed bridge pier utility mode.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The pictorial of FIG. **1** illustrates the originally conceived environment of the invention which is a mountainous logging site served by a skyline cable logging system.

Mast **11** is associated with the yarder **10** to support the live end of the cable **12**. Guy wires **13** are tightly tensioned between the mast top and the present invention anchor piers **20**.

FIGS. **2**, **3** and **4** illustrate the prime embodiment of the invention which basically comprises a substantially solid concrete body block **21** having a front end **22** from which projects a draft bar **23**. A tubular aperture **24** through the draft bar **23** accommodates a lift and tow tether.

From the top **25** of the body block **21** projects a multiplicity of ground engaging spikes **26** raked at an approximately 60° angle toward the block back **27**. Projection distance above the top surface **25** is not critical but one foot is representative.

Wheels **30** are removably mounted on hubs **30***a* rotatively secured to bearing tubes **31**. The bearing tubes are set into the body block **21** with the wheel axis **32** positioned above the block bottom **28** that distance required for adequate ground clearance G, usually about 9 to 12 inches. Essential is the condition that the wheels **30** be completely clear of the ground when the body block **21** is inverted to the bottom side **28** up position illustrated by FIG. **5**. Preferably, the bearing tube axis **32** is positioned between the top and bottom surfaces **25** and **28** and relative to the bottom surface **28** so that no portion of the hub **30***a* projects into the spacial plane of the top **25**.

Internal construction of the body block **21** is illustrated by FIGS. **6**, **7** and **8**. The draft bar **23** is a structural H-section that extends substantially the full length of the body block **21**. In the vicinity of the wheel bearing tubes **31**, H-section cross-members **40** are welded to the draft bar **23** and to respective end braces **41**. Downcomer braces **42** welded to the end braces are positioned behind the wheel bearing tubes **31**.

Ground spikes **26** are welded to the draft bar **23** and the cross-braces **40** in the pattern shown by FIG. **7**.

A heavy wall pipe section **43** welded to both, the draft bar **23** and the forward cross-brace **40** at the intersection therebetween will form and sleeve the tether loop aperture.

Although specially fabricated wheel bearing tubes **31** may be used, it is most economical to utilize a heavy truck drive axle housing that has been stripped of the drive components. The banjo housing for the drive wheel differential serves as an ideal load distributor to the subsequently cast concrete mass of the body block **21**.

Fabrication of the invention begins with construction of the T-frame which comprises the draft bar **23**, the cross-braces **40**, the ground spikes **26** and other bracing structure integral therewith. With the skeletal framework complete, the assembly is inverted and leveled upon the ground spikes **26**. Relative to FIG. **9**, a sand bed **50** is packed around the spikes **26** to the desired level of spike exposure.

Next, a concrete form box **51** is assembled around the skeletal frame and level aligned relative thereto. Correctly positioned notches **52** are cut into the form box sides to receive the wheel bearing tubes **31** which are also leveled, aligned and the open notch remainder plugged.

All essential components of the anchor being aligned and secured, a matrix of reinforcing bars **53** is constructed within the remaining form box space.

An anchor body block **21** having length width and height dimensions of 8 feet, 6 feet and 3 feet, respectively will require approximately five and one-half cubic yards of concrete thoroughly tamped and vibrated into and around the internal steel-work aforedescribed. Seven days of damp cure are normally adequate prior to form removal. Thereafter, the anchor is ready for use upon form removal, wheel mounting and cutting of the reinforcing bar **53** projections. The completed anchor is tethered by a cable between the draft bar **23** and an appropriate vehicle such as a wheel skidder and upended by rolling over the back end **27** onto the wheels **30**.

FIGS. **11**, **12** and **13** illustrate an alternative embodiment of the invention suitable for application in those circumstances wherein obstructions or insufficient space prohibit the end-over-end inversion of the anchor.

The body block of anchor **60** is substantially the same weight and configuration as previously described block **21**. However, the ground spikes **61** of the FIG. **11** embodiment are limited to a single row across the front, bottom edge of the block. The tether loop aperature **62** is positioned as near the block back face as structurally prudent and behind the wheel axis **63**.

Flexibility of the present invention as a logging site tool is illustrated by FIGS. **14**, **15** and **16** where two of the FIG. **2** embodiment anchors **20** are set on respective sides of a stream bed. With the wheels **30** removed, hubs **30***a* do not obstruct the planar continuity of block bottom surface **28** thereby permitting bridge stringers **70** to be laid across the anchors **20** as a foundation pier. With decking **71** and curbing **72**, a useful temporary bridge is quickly assembled for vehicular crossing of small streams, gullys and washes.

Having fully described our invention, its alternative embodiments and uses, others will perceive additional uses or construction techniques. As our invention, however,

We claim:

1. A portable earth anchor comprising reinforced concrete body means, having top, bottom, front, rear and side surfaces, draft attachment means projecting from said body means front surface for moving and positioning said body means, ground penetrating spike means projecting from the top surface of said body means and wheel carriage means projecting coaxially from respective sides of said body means wherein the axis of said carriage means is disposed between said top and bottom body surfaces and more proximately of said bottom surface whereby said carriage means is positioned out of contact with a ground support surface when said anchor means is inverted for ground penetration of said spike means.

2. A portable earth anchor as described by claim 1 comprising a tubular aperture located between the side surfaces of said body means and axially penetrating said body means between said top and bottom surfaces for securing a tether to the body of said anchor.

3. A portable earth anchor as described by claim 1 wherein said carriage means comprises wheels, wheel hubs and bearing tubes, the axis of said carriage means being positioned relative to said bottom surface whereby the entirety of said wheel hubs are located between substantially parallel planes respective to said top and bottom surfaces.

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